UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/680,158	10/08/2003	Chandra Mouli	M4065.0985/P985	5806

24998 7590 07/05/2005

DICKSTEIN SHAPIRO MORIN & OSHINSKY LLP
2101 L Street, NW
Washington, DC 20037

EXAMINER	
WEISS, HOWARD	
ART UNIT	**PAPER NUMBER**
2814	

DATE MAILED: 07/05/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

AK

Office Action Summary	**Application No.** 10/680,158	**Applicant(s)** MOULI, CHANDRA	
	Examiner Howard Weiss	**Art Unit** 2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *02 May 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-67* ~~is~~/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-45 and 47-66* ~~is~~/are rejected.

7)☒ Claim(s) *46 and 67* ~~is~~/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Attorney's Docket Number: M4065.0985/P985

Filing Date: 10/8/03

Continuing Data: none

Claimed Foreign Priority Date: none

Applicant(s): Mouli

Examiner: Howard Weiss

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 to 7, 11, 12, 17 to 21, 23, 24, 28 to 34, 37, 41 to 45, 47 to 53, 56, 57 and 62 to 66 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohsawa et al. (IEEE 2002) and Pham et a. (U.S. Patent No. 6,838,322).

Ohsawa et al. show most aspects of the instant invention (e.g. Figures 1 to 3) including:

- an SOI substrate with two layer of opposite conductivity type (i.e. P and N)
- a partially depleted storage transistor located on said substrate's surface (e.g. Figures 1)
- first and second source/drain regions **n** with a body portion **p** there between
- a gate structure consisting of a gate electrode and insulating layer of silicon oxide
- a word line **WL** connected to said gate structure and a bit line **BL** connected to one of said source/drain regions

Ohsawa et al. do not show the storage transistor as a FinFET with the gate structure wrap around the body portion in at least two planes and consisting of a plurality of gates, the gate electrode comprising doped polysilicon or metal, the thickness of the insulating layer being thicker on the top of the body portion than on the sides, the source/drain regions being raised and consisting of layers of materials with different band gaps and band gaps.

Pham et al. teach (e.g. Figure 9) to form FETs as FinFETs with the gate structure wrap **24** around the body portion **20** in at least two planes and consisting of a plurality of gates (Column 2 Lines 33 to 35), the gate electrode comprising doped polysilicon or metal (Column 5 Line 66 to Column 6 Line 3), the thickness of the insulating layer being thicker on the top **22** of the body portion than on the sides, the source/drain regions **33** being raised and consisting of layers of materials **32, 34** with different band gaps (e.g. Figure 5) to obtain suitable threshold voltages for high-speed logic devices while controlling extrinsic resistance (Column 1 Lines 51 to 60). It would have been obvious to a person of ordinary skill in the art at the time of invention to form FETs as FinFETs with the gate structure wrap around the body portion in at least two planes and consisting of a plurality of gates, the gate electrode comprising doped polysilicon or metal, the thickness of the insulating layer being thicker on the top of the body portion than on the sides, the source/drain regions being raised and consisting of layers of materials with different band gaps as taught by Pham et al. in the device of Ohsawa et al. to obtain suitable threshold voltages for high-speed logic devices while controlling extrinsic resistance.

Since the Applicant has not established the criticality of the doses stated and since these doses are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values in the device of Ohsawa et a. and Pham et al. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).*

3. Claims 8 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohsawa et a. and Pham et al., as applied to Claim 1 above, and further in view of Hu et al. (U.S. Patent No. 5,448,513).

   Ohsawa et a. and Pham et al. show most aspects of the instant invention (Paragraph 4) except for the heavily doped region of a second conductivity adjacent to one of the source/drain regions and separated form the other source/drain region. Hu et al. teach (Figure 1A) to have a heavily doped region **16** of a second conductivity adjacent to one of the source/drain regions **12** and separated form the other source/drain region **14** to use less voltage during write operations (Column 4 Lines 50 to 53). It would have been obvious to a person of ordinary skill in the art at the time of invention to have a heavily doped region of a second conductivity adjacent to one of the source/drain regions and separated from the other source/drain region as taught by Hu et al. in the device of Ohsawa et a. and Pham et al. to use less voltage during write operations.

4. Claims 14 to 16, 38 to 40 and 59 to 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohsawa et a. and Pham et al., as applied to Claim 1 above, and further in view of Matsumoto et al. (U.S. Patent No. 6,806,537).

   Ohsawa et a. and Pham et al. show most aspects of the instant invention (Paragraph 4) except for the source/drain regions having a silicide in contact therewith, the silicide different for the source/drain regions. Matsumoto et al. teach (Figure 25) to silicide **45** contacts to source/drain regions **10** to reduce the gain of any parasitic bipolar transistors (Column 17 Lines 56 to 60). It would have been obvious to a person of ordinary skill in the art at the time of invention to silicide contacts to source/drain regions as taught by Hu et al. in the device of Ohsawa et a. and Pham et al. to reduce the gain of any parasitic bipolar transistors.

In reference to the silicide and concentrations of the sources/drain regions, it would have been obvious to one having ordinary skill in the art at the time the invention was made to make the silicide contacts and dopant concentrations different, since it has been held that where the general conditions of a claim are disclosed in the prior art, discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller, 105 USPQ 233.*

5. Claims 15 and 58 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohsawa et a. and Pham et al., as applied to Claim 1 above, and further in view of Takasu (U.S. Patent No. 5,307,305).

Ohsawa et a. and Pham et al. show most aspects of the instant invention (Paragraph 4) except for the insulating material having a high dielectric constant. Takasu teaches (Figure 1) to use insulating material **15** having a high dielectric constant to obtain good FET characteristics (Column 17 Lines 56 to 60). It would have been obvious to a person of ordinary skill in the art at the time of invention to use insulating material having a high dielectric constant as taught by Takasu in the device of Ohsawa et a. and Pham et al. to obtain good FET characteristics.

6. Claims 9, 10, 27, 36, 54 and 55 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ohsawa et a. and Pham et al., as applied to Claim 1 above, and further in view of Yu et al. (U.S. Patent No. 6,221,724).

Ohsawa et a. and Pham et al. show most aspects of the instant invention (Paragraph 4) except for the body portion containing an inert dopant. Yu et al. teach (Figure 1) to use an inert dopant **46** in a body portion **12** to suppress punch-through (Column 2 Lines 1 and 2). It would have been obvious to a person of ordinary skill in the art at the time of invention to use an inert dopant in a body portion as taught by Yu et al. in the device of Ohsawa et a. and Pham et al. to suppress punch-through.

Since the Applicant has not established the criticality of the doses stated and since these doses are in common use in similar devices in the art, it would have been obvious to one of ordinary skill in the art to use these values in the device of Ohsawa et a. and Pham et al. Where patentability is said to be based upon particular chosen dimensions or upon another variable recited in a claim, the applicant must show that the chosen dimensions are critical. *In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).*

Allowable Subject Matter

7. Claims 46 and 67 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

8. Applicant's arguments filed 5/2/05 have been fully considered but they are not persuasive. In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988)and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, the motivation to combine the reference can be found in Pham et al. (to obtain suitable threshold voltages for high-speed logic devices while controlling extrinsic resistance; Column 1 Lines 51 to 60). Pham et al. state that "intense channel doping" may cause a degrade in transistor characteristics. Since these are partially depleted devices, intense doping would be avoided.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

In reference to any mention to using a FinFET as a storage device or including channel doping, Pham et al. state that their invention is not limited to any particular type of integrated circuit described in their patent or becoming part of a more complex or different fabrication process (Column 9 Lines 5 to 14). In view of these reasons and those set forth in the present office action, the rejections of the stated claims stand.

Conclusion

9. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Houston (U.S. Patent Application No. 2005/0062088) show a 1T DRAM device similar to the instant invention.

10. Paper copies of cited U.S. patents and U.S. patent application publications will cease to be mailed to applicants with Office actions as of June 2004. Paper copies of foreign patents and non-patent literature will continue to be included with office actions. These cited U.S. patents and patent application publications are available for download via the Office's PAIR. As an alternate source, all U.S. patents and patent application publications are available on the USPTO web site (www.uspto.gov), from the Office of Public Records and from commercial sources. Applicants are referred to the Electronic Business Center (EBC) at http://www.uspto.gov/ebc/index.html or 1-866-217-9197 for information on this

policy. Requests to restart a period for response due to a missing U.S. patent or patent application publications will not be granted.

11. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

12. Papers related to this application may be submitted directly to Art Unit 2814 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1096 OG 30 (15 November 1989). The Art Unit 2814 Fax Center number is **(703) 872-9306**. The Art Unit 2814 Fax Center is to be used only for papers related to Art Unit 2814 applications.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Howard Weiss at **(571) 272-1720** and between the hours of 7:00 AM to 3:00 PM (Eastern Standard Time) Monday through Friday or by e-mail via **Howard.Weiss@uspto.gov**.

14. The following list is the Examiner's field of search for the present Office Action:

Field of Search	Date
U.S. Class / Subclass(es): 257/347	6/28/05
Other Documentation: none	
Electronic Database(s): EAST	thru 6/28/05

HW/hw
28 June 2005

Howard Weiss
Primary Examiner
Art Unit 2814